

## Notes on Some California Mollusca: Geographical, Ecological, and Chronological Distribution

BY

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RECENTLY I HAD CAUSE to review an accumulation of benthic molluscan specimens taken from off the coast of northern California. This review consisted of rechecking on both the benthic as well as the geographical localities from which the specimens were obtained, plus a comparison of the same species from the fossil fauna of coastal northern California. In several instances definite extensions of published ranges of the species were noted; in other instances new or additional data concerning the benthic distribution were obtained, and data on the fossil counterparts to Recent species appeared to warrant a discussion of their distribution in time. These notes are presented in the hope that they will be of use and interest to the malacologist, ecologist, and paleontologist.

The study area was limited to the fishing localities visited by the commercial drag boat fleet operating out of Humboldt Bay, California. This extended approximately from the submerged Noyo Canyon off Fort Bragg, Mendocino County, California (Lat. 39°30' N) to off Mack Arch, just north of Brookings, Curry County, Oregon (Lat. 42°15' N). I was fortunate with the fossil faunas, as the various exposures of the Wildcat Group (OGLE, 1953), plus additional sites (all definitely tied into this Wildcat Group) presented a nearly continuous sequence in time from the Upper Miocene to Pleistocene, whereby it was possible to trace many of the species and all of the genera from the faunal change of the Lower Pliocene into the Recent.

All of the species and specimens discussed here are in the Talmadge collection, Eureka, California, with the noted exceptions.

*Polinices lewisii* (Gould, 1847)

This species is well known from deep intertidal to subtidal levels. Material now at hand has been taken at 20 fathoms in crab pots off this area; the *Anna W.* brought in specimens taken on a sandy mud substrate off Trinidad,

Humboldt County, California (Lat. 41°05' N), which had been obtained in a tow made between 75 and 100 fathoms in depth. The specimens were found amid *Polinices draconis* (Dall, 1903) and *Calanaticina oldroydii* (Dall, 1897). Fossil *P. lewisii* are found in several localities, all within the Upper Wildcat fauna and all in a sandy siltstone within a shallow-water molluscan association.

*Trophonopsis fleenerensis* (Martin, 1914)

MARTIN (1914) described this Pliocene species from near Fleener Creek, in the Centerville Sea Cliffs, Humboldt County, California. I have taken specimens from the type locality, and the associated molluscan specimens indicate a rather deep water fauna living on a sandy mud substrate. Recent specimens are all collected on a soft sandy mud at a depth of at least 200 fathoms. I cannot see any separation of the Pliocene from the Recent specimens by ecological or shell characteristics.

*Colus tahwitanus* Dall, 1918

This species is the common *Colus* of the study area. It appears to live on a firm blue or grey mud at a depth in excess of 200 fathoms. For a geographical location I use the mid-point of the study region, "off Eureka, Humboldt County, California (Lat. 40°45' N)." Although another species, *C. hallii* (Dall, 1873) = "*C. halibrectus* (Dall, 1891)" of STEWART & STEWART (1949) is known from the Centerville Sea Cliff exposure, and FAUSTMAN (1964) records an undescribed species from the Eel River exposures, I have never seen a specimen of *C. tahwitanus* in fossil form.

*Mohnia frielei* (Dall, 1891)

As far as I know, only one specimen of this species has been obtained from within the study area. A single specimen was found in a fish box full of broken siliceous sponge, taken from off Mack Arch, Curry County, Oregon, in 360 fathoms by the *Ina*. It is difficult to base the

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habitat upon a single specimen, especially when no additional *Mohnia* have been found in many boxes of this massive sponge culled over for specimens. However, this one specimen does extend the published range of the species to the south (Lat. 42°15' N). I have seen no fossils of this species or genus from northern California.

*Neptunea phoenicea* (Dall, 1891)

Although juvenile specimens have reached me from time to time, all collected on a soft grey or blue mud and always from depths in excess of 300 fathoms, I have only a single record of an adult specimen. This one, a male, 94 mm in length, was taken in 380 fathoms off Crescent City, Del Norte County, California (Lat. 41°55' N) by the drag boat *Lynda Dawn*. The specimen cannot be separated from Alaskan or Washington specimens by shell characteristics. I have not found this species as a fossil in the area.

*Neptunea smirnia* (Dall, 1919)

I have specimens of this species collected as far south as the submerged Noyo Canyon off Fort Bragg, Mendocino County, California (Lat. 39°30' N). Living examples of this species taken within the study area all appear to be restricted to a blue or grey solid mud, and are usually taken from depths between 300 and 400 fathoms. This presents a rather wide range of benthic tolerance, but one that is matched by the local *Buccinum strigillatum* Dall, 1891. Egg masses are deposited on any solid object, rock, shell, or sponge. Dall's type locality was in the Straits of Juan de Fuca in 114 fathoms, but RICE (1968) has cited references as shallow as 42 and 65 fathoms. BERNARD (1967) gives the depth as 205 fathoms. Locally, crabbed shells have been found at depths as shallow as 150 fathoms.

FAUSTMAN (1964), in his paper on the Wildcat fauna listed this species from the Scotia Bluff Sandstone, which is high up in Wildcat time, and is associated with a fauna representative of depths less than 100 fathoms. I have obtained crabbed specimens of *Neptunea smirnia* from 150 fathoms, as mentioned above; in 1969 a group from Humboldt State College and I watched an eddy current bring in subtidal and benthic specimens of *N. tabulata* (Baird, 1863) from a deep inshore channel onto the sand flats formed behind Pillar Point on the Straits of Juan de Fuca, Washington. It is quite possible that Faustman's specimen had found its way into this shallow water deposit by one of these two mentioned methods. I have a fossil specimen, taken in the Centerville Beach exposure of the

Wildcat formation, but this site has a fauna comparable to the Recent fauna found in 200 fathoms of water.

*Clinocardium nuttallii* (Conrad, 1837)

This sought-after cockle comes into the shallow waters of Humboldt Bay to breed during the winter months; it then is taken for food purposes in the deep intertidal levels on a sandy substrate. It is known to live in deeper waters, but it was a great surprise to me when the *Admiral King* obtained a specimen for me from 100 fathoms of water off a sandy mud substrate. A short time later the *Claremont* obtained a second specimen from a similar depth. Both specimens were obtained from off Eureka, Humboldt County, California. In many respects this duplicates the work of BERRY (1954) on *Mytilus californianus* Conrad, 1837.

*Thyasira disjuncta* (Gabb, 1866)

Both OGLE (1953) and FAUSTMAN (1964) referred to *Thyasira bisecta* (Conrad, 1849) from the Wildcat Group. Ogle's locality is now buried beneath silt brought in by the 1964 flood, but his comments on a *Lucina* and *Solemya* association match the association of mollusks where I found specimens of *T. disjuncta* on the Eel River exposure, which was not exposed until the December 1964 flood altered the river bed, covering one side and exposing the opposite side. Faustman's locality, B-7640, is across the river from where I found the species and his locality may be noted as an occurrence of similar strata across the Eel River. I have also obtained a specimen, probably Pleistocene, from a sandstone projection extending out into the submerged Eel Canyon, which was caught in the net of the *Mineo Brothers*. Recent specimens are known from off this same area. Mr. Dan Gotsdall, Biologist for the Eureka Office of the Department of Fish and Game, obtained a specimen from a shrimp grab while making biological studies off northern California. His specimen was obtained from a depth of about 75 fathoms. The *Anna W.* brought me a specimen taken in nearly 100 fathoms from near Redding Rock (Lat. 41°22' N), while fishing on a sandy mud substrate. Fragments are obtained from time to time, so the species appears to be not too rare off this portion of the California coast.

The flood of 1964 also carried away the overburden from the Upper Miocene sandstone member of the Pullen Formation of Ogle on the east side of the Eel River at Scotia, Humboldt County, California. Among the poorly preserved fossils are two specimens of *Thyasira bisecta*. However, in this area the two species appear to be separated both in time as well as in shell characteristics.



*Macoma astori* Dall, 1909

There are some arguments regarding the identification of the Pliocene *Macoma astori* Dall, 1909 with *M. lipara* Dall, 1916. *Macoma astori* is common in some layers of sandstone along the Eel River exposure of the Wildcat Group. I have also obtained a small suite of Recent specimens from a sandy substrate in roughly 50 fathoms of water. I cannot separate the two species, fossil or Recent, nor can I see any difference between Wildcat and Empire fossil material. In my opinion, all are the same, both Recent and fossil; thus, following FAUSTMAN (1964) I accept the name *M. astori* for both the fossil as well as the Recent species. For the record, I cite the locality as "Off Eureka, Humboldt County, California (Lat. 40°45' N), in 50 fathoms on a sandy substrate."

## ADDENDUM

*Clinocardium nuttallii* (Conrad, 1837)

After the original data were submitted for publication, the local dragboat fishermen brought in numerous examples of this species, both living and freshly dead specimens, all taken on a muddy sand substrate, from depths between 50 and 100 fathoms. It now appears that *Clinocardium nuttallii* is more or less common down to 100 fathoms if suitable substrate is available.

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